



inps journal

Indiana Native Plant Society

Summer 2021

A Bittersweet Tale of Two Lianas

By Noel B. Pavlovic

Oh, the lovely American bittersweet (*Celastrus scandens*, Celastraceae) — a woody vine (*liana*) that produces bright clusters of orange fruits at its branch tips. The fruits are stunning and capture the attention of anyone that sees them in the fall. American bittersweet is confined to the eastern half of the United States and has been declining in the Northeast and Atlantic seaboard. Formerly it was found along fencerows, forested pond edges, and disturbed forest areas as well as in open habitats. Around 2000, I realized that the open sand dunes of the Great Lakes were a refuge for American bittersweet, and this observation opened opportunities for new research.

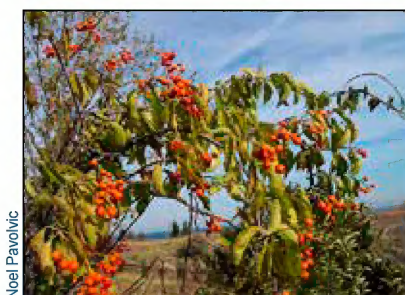
The major woe for American bittersweet is its cousin, Asiatic bittersweet (*Celastrus orbiculatus*). After its introduction to New York City in 1874, Asiatic bittersweet expanded in gardens and later was picked up by the floral trade for fall floral decorations (Del Tredici 2014). This invasive species strangles and kills trees and alters vegetation succession. Unlike the native species, which only produces fruit at branch tips, Asiatic bittersweet produces clusters of flowers and fruits in almost every leaf axil. The characteristics that allow American bittersweet to survive in coastal dune habitats, namely stress tolerance and slow growth, are inimical to the floral trade that desires the ramped growth of the Asiatic species. When Wrigley Field in Chicago was constructed it was realized that the Boston ivy would not be able to cover the outfield brick wall in time for opening day, so fast growing Asiatic bittersweet was planted while the Boston ivy could mature in size (Will 2014).

Asiatic bittersweet was introduced into the Indiana Dunes between the town of Dune Acres and the Indiana Dunes State Park in the 1950-60's where it was confined when I arrived in 1983. By 2000, it occupied 2.4% of the dunes landscape and by 2012 had increased to 26.9% of the

landscape. Although Asiatic bittersweet prefers shaded habitats, our research showed it could invade prairies and savannas (Leicht-Young et al. 2013). Once humans brought Asiatic bittersweet to the dunes, native birds began to disperse the seeds in the fall after the bittersweet arrangements were discarded onto brush piles.

In 2005, I, and fellow research colleagues, started to answer fundamental questions regarding the relationships between the two bittersweets, including how to confidently tell them apart throughout the year. In our first study we

Invasive plant profile



Noel Pavlovic

The lovely fruits of American bittersweet, a plant we called 'Fertile Myrtle' at the Indiana Dunes.

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found that we could only distinguish the plants by mature leaves 90% of the time (Leicht-Young et al. 2007). Strikingly, though, the *first* leaves of the year emerge differently between the two: American bittersweet leaves unroll as two sides of a scroll (involute or in-rolled) while Asiatic bittersweet leaves emerge as pages of a book (conduplicate, two folded against each other). Later leaves of both species emerge in the same fashion (conduplicate; see USGS 2021). The confusion of species identification has in part led to the selling of Asiatic bittersweet as American bittersweet; 53% of 18 plants were misidentified and 7 of 11 nurseries sold misidentified plants (Zaya et al. 2017).

Our second research question was whether hybridization between the two species might be compromising our native bittersweet. We found, genetically, that the two species hybridized but

Lianas - continued on page 2

Lianas — continued from page 1

the seeds of the hybrids were sterile (Zaya et al. 2015). This explained why hybrids were not pervasive where the populations met, but not why American bittersweet is declining. More detailed studies, however, revealed that Asian plants produce much more pollen than their American cousins and that its pollen was more successful at crossing with American stigmas. Thus, American bittersweet gets genetically swamped by Asiatic pollen resulting in local extirpation. Asiatic bittersweet produces 200 times more male flowers and 95 times more female flowers than American bittersweet. This interference extends beyond 300 feet, so to protect American bittersweet, Asiatic bittersweet has to be removed for a considerable distance (Zaya et al. 2021).

Since fire is a natural process in prairies and savannas, we needed to understand how Asiatic bittersweet responds. More bad news: the data showed that burning initiated root suckering and could more than double the density of stems (Pavlovic et al. 2016). With extensive horizontal roots, Asiatic bittersweet can spread quite broadly and make it difficult to eradicate. We gave up excavating one root after digging horizontally for over 15 feet. On a promising note, in one experiment we followed the carbohydrates (think starches) stored in the roots of the plants over the seasons. These root carbohydrates are stored over the growing season and depleted in the spring when the carbohydrates provide energy for new growth after breaking dormancy. Cutting the plants in early July immediately after the spring growth spurt, resulted in a 50% reduction in root carbohydrates from their normal levels. While we have not yet done the experiment, this pattern suggests that herbiciding Asiatic bittersweet might be more successful in late summer and early fall after cutting because they are much weaker than normal.

In 2010, I gave a talk in St. Paul, Minnesota about our bittersweet research. A few years later the Minnesota Extension Service got a law passed

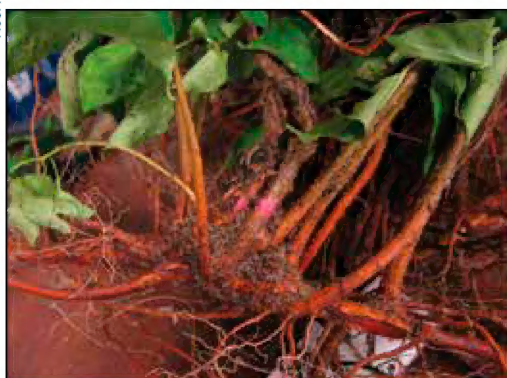
by the state legislature that banned the sale and transport of Asiatic bittersweet within the state. Subsequently, I happily saw American bittersweet growing in a Minnesota hill prairie free of invasive pollen. Some good has come from our research regarding this bittersweet tale of two lianas. If more states along the west side of the Mississippi River ban the sale and transport of Asiatic bittersweet, the American bittersweet may be able to range more freely across the plains.

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Noel B. Pavlovic, a member of the Northern Chapter of INPS, is an incorrigible botanist and a research plant ecologist working at the US Geological Survey, Lake Michigan Ecological Research Station in the Indiana Dunes National Park.

Noel Pavlovic



Top: The yellow orange fruits of Asiatic bittersweet (*C. orbiculatus*).

Bottom: The extensive root sprouting of Asiatic bittersweet, the orange resprouts as compared to the original stems that are painted pink.

We Can Make a Difference. Start Digging!

By Gillian Field

HOMEGROWN NATIONAL PARK™ is a movement taking off across the country to increase native plants in our own yards and on the grounds of our churches, schools, and businesses. No matter how small, your contribution can support our entire ecosystem.

HOMEGROWN NATIONAL PARK™ is a grass-roots organization that is an outgrowth of research by Douglas Tallamy and others (Adler 2020). Tallamy helps us understand that non-native plants (predominant in our yards) do not offer the same benefits as the native plants that they displace. And when some of these nonnatives become dominant and invasive (which they can do when they escape from our gardens unnoticed and exponentially spread), native plants cannot reestablish themselves.

The message is clear: our quality of life is dependent on how quickly we can reduce our lawn area and switch the majority of our non-native plant base to native plants from our region. This change in our landscape will increase the ability of our pollinators, birds, wildlife, and native ecosystems to thrive.

Tallamy argues that private property owners are in the best position to increase the native plant base of the country as a whole. This increase of native plants in our yards will, bit by bit, become so large that it will be the equivalent of adding many national parks throughout the country. Thus the name 'Homegrown' National Parks.

What does this mean for your yard? As you are making landscape choices, consider the bigger picture and the significance of the plants you have chosen. Whether your property blends into a native habitat or your yard is nestled in the center of a high-density urban area, be sure your non-native ornamental plants aren't escaping beyond your intended design area. Learn which plants in your yard are non-native and invasive and, as you can, replace these with plants native to your region.

In some cases it can seem a hard decision to cull and replace your non-natives with natives, but an understanding that non-native plants fail to support our diverse wildlife and are degrading Indiana forests, wetlands, and even our quality of life, may prove persuasive.

HOMEGROWN NATIONAL PARK™ is about

reducing non-native plants and lawns and adding native trees, shrubs, flowers, ferns, and ground cover adapted to climate conditions that have evolved with insects and animals in your area one connected yard to another. Learn more at www.homegrownnationalpark.org/ and add to the map.

Gillian Field is a member of the South Central Chapter of INPS and MC-IRIS (Monroe County — Identify and Reduce Invasive Species).

She published a version of this article in the Bloomington Herald-Times on April 17, 2021.

Reference

Adler, J. 2020 (April). Meet the ecologist who wants you to unleash the wild on your backyard. Smithsonian Magazine. <https://www.smithsonianmag.com/science-nature/meet-ecologist-who-wants-unleash-wild-backyard-180974372/>.

Homegrown National Park™ is a term coined by Douglas Tallamy.

"Our National Parks, no matter how grand in scale, are too small and separated from one another to preserve species to the levels needed. Thus, the concept for Homegrown National Park, a bottom-up call-to-action to restore habitat where we live and work, and to a lesser extent where we farm and graze, extending national parks to our yards and communities."

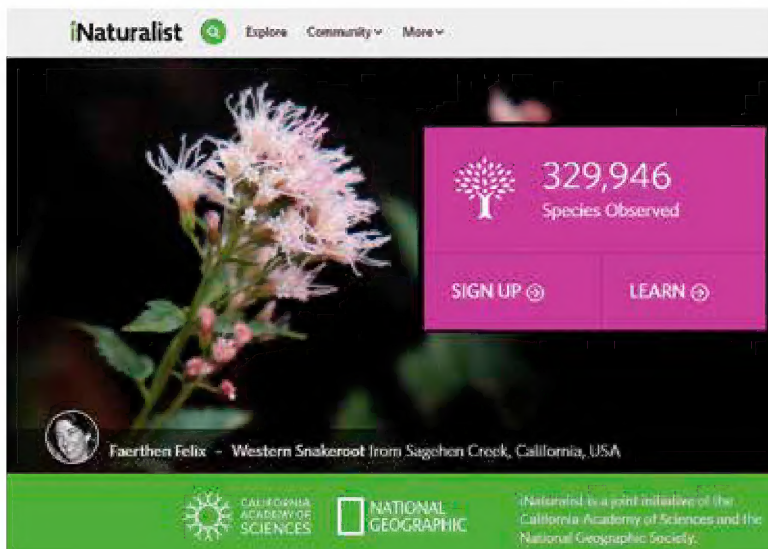


Best Plant Identification

By Caitlin Osburn

With warmer weather and the end of spring semester in sight, I found myself venturing into Christy Woods and spotting unfamiliar plants. With no field guide handy, I grabbed my phone and captured a couple of photos of mystery plants to look up on the internet when I got home. Finding the answers this way can be a tedious process while searching forums for photos that looked like mine, only to come up short and unsure. Wouldn't it be simpler, I thought, if there was something that could identify a plant and offer information about it in a matter of seconds?

Luckily, as with seemingly everything, there are apps for just that. However, the increasing number of plant identification apps can be overwhelming. I looked for apps that were accurate but also easy to learn how to use. I tested three of the top-rated plant identification apps -- iNaturalist, Pl@nt Net, and Plant Snap -- to see which one seemed the most user-friendly and reliable. Each is available for both iOS and Android systems. Here is what I found.

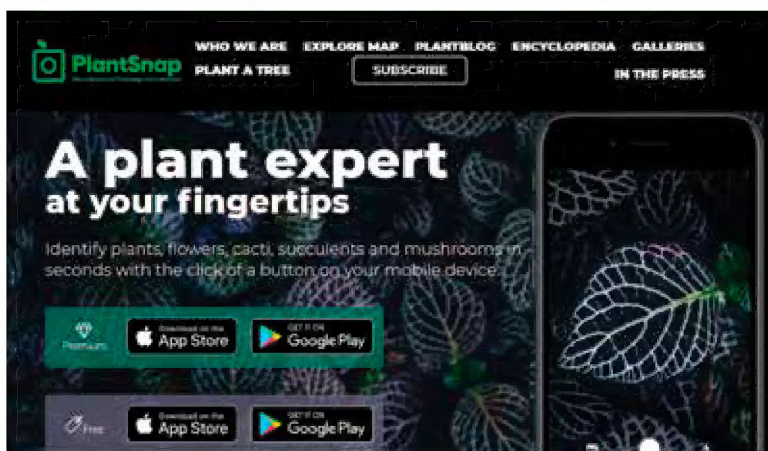


iNaturalist provides information about plants and wildlife by using Artificial Intelligence, as well as a community of scientists and naturalists. Users can make use of field guides created by other users to virtually explore areas such as national parks and museums.

Positive reviewers noted that they especially liked engaging with other people who shared interests in wildlife and that there are no ads while using the app. I personally enjoy how engaging the app is and how much you can learn while using it.

While this app has a considerable amount of accuracy, the results are not immediate. You have to wait for other users to identify the plant or wildlife for you, which would be my one criticism.

Users also mentioned that the app can sometimes be buggy and is prone to crashing, particularly when using Android or Google phones; however, I did not find this to be an issue.



Plant Snap is an app for identifying various plants – trees, succulents, weeds – even from a single well-formed leaf or flower. You can either search by taking a photo or by the name of the species, if you already know what it is. The app also allows you to connect with other nature lovers by posting and sharing photos, gardening tips, and other nature discoveries. Plant Snap also states that they plant a tree for every person that downloads the app and becomes a registered user.

While reviewers liked the variety of things to do on the app, many were dissatisfied with their experiences, noting that you have to pay in order to obtain full access to Plant Snap, and, even then, there were many negatives about it.

Apps for Your Smart Phone

Plant Snap was the weakest of the apps for me. The app only allows you ten free plant IDs per day, and many were inaccurate, especially for natives. Where I found this app to be most commanding was identifying ornamental plants as well as more common garden plants. This app also would be good if someone was interested in a plant focused social media platform.

Pl@ntNet (at www.plantnet.org) aids users in the observation and identification of a wide variety of plant species by simply taking a photo on your phone. The app is currently able to identify about 20,000 species of plants. The developers note that the more engagement there is with the app, the more information their analysts can provide.

The latest update added a feature to interact with other users by commenting on someone's observations and findings, notifications when someone has commented on your photos and when one of your sightings has been reviewed, as well as technical support to fix reported bugs.

Pl@ntNet receives an abundance of positive reviews, most of which are praising the accurate results and user-friendly interface of the app. When bugs or problems occur with the app, the developers seem quick to provide fixes and engage with their users.

Overall, I found Pl@ntNet to be the best app in efficiency and accuracy. The results were quick, and I enjoyed how you could specify what part of the plant the app should focus on for precise answers. I felt that it was easy to use but still had lots of features in case I wanted to go back and learn more about what other people have been identifying. Next time I have any inquiries while enjoying a walk in the woods, this will be my go-to app for plant identification.

Caitlin Osburn is a student at Ball State University and a student member of the Central Chapter of INPS.



— *Save the Date* —

INPS Annual Conference - WILD INDIANA
Saturday, November 13th
at 502 East Event Center in Carmel

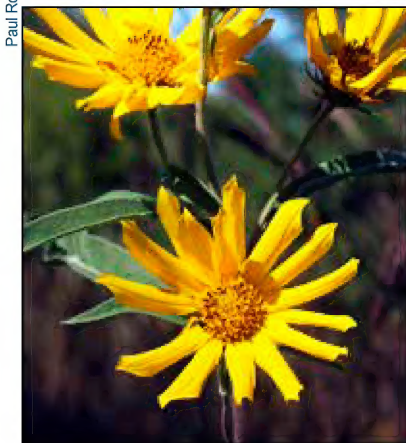
Answers from page 9 Seedling Quiz:

A = touch-me-not (*Impatiens capensis*)

B = Jack-in-the-pulpit (*Arisaema triphyllum*)

Where does it grow?

By Howard Webb



Paul Rothrock

Above: The non-native large sweet vernal grass (*Anthoxanthum odoratum*) has fragrant foliage and a vanilla-like taste. Do not confuse it with the equally fragrant *Anthoxanthum hirtum*, a native species of northern Indiana.

Below: The native range of Maximilian sunflower, like many of our showy sunflowers, is obscure. Earliest collections from Indiana date to around 1927 (Deam's earliest was 1930) and mostly were along railroads.

Fellow INPS member Paul Rothrock occasionally walks through my neighborhood observing various gardens, and stops to look over my front yard prairie to see what is blooming. If I happen to be outside at these times, we end up in an enjoyable conversation. The last time he stopped by I asked him if sweet vernal grass (sold as *Hierochloë odorata*) and Maximilian sunflower (*Helianthus maximiliani*) were “natives.” I had picked up the sweet vernal grass from a local nursery and it has spread into the prairie. I was familiar with Maximilian sunflower and its profusion of branching flowers, as it was a common prairie species where I used to live in Missouri, but I was not sure it was common east of the Mississippi.

Paul was not sure of the answer either, but suggested I consult Midwest Herbaria (<https://midwestherbaria.org>). I knew of the website, but always thought of it as a more academic enterprise rather than something for the casual gardener. It turns out I was quite wrong, and in fact it has a number of uses for the Midwestern gardener.

The search for *Helianthus maximiliani* turned up three records in the Bloomington area, all by Charles B. Heiser, Jr. between 1948 and 1951. For me, this was a quick success – I could see that the species is found in the area. The one historic record, though, was along a railroad right-of-way (as are most collections from Indiana) and another from a field where one might expect disturbance. This raises the possibility of spread by human activity and that it may not be a locally native species.

The search for sweet vernal grass proved more challenging. I started my search by using the common name. As I typed in ‘sweet’ a long

list of candidates appeared. But adding ‘vernal’ reduced the list to a more manageable list of eight. Of these, two species had Indiana specimens, namely large and northern sweet vernal grass. The former, I discovered, is a Eurasian introduction that is occasionally seen in southern Indiana while the latter is a conservative native grass that occurs in northernmost Indiana. Thanks to other website information (photos, descriptions, and links) I narrowed my grass down to the non-native species whose correct name is *Anthoxanthum odoratum* and not *Hierochloë odorata*. Given these results, I will limit the sweet vernal grass to the more ornamental part of my landscape.

I found several useful strategies for searching:

Using a scientific name is typically better than a common name. If you don't know the scientific name, do a Google search on the common name. You will usually get some hits from Wikipedia. Checking seed catalogues like Prairie Moon (www.prairiemoon.com) or Missouri Wildflower Nursery (<http://mowildflowers.net>) is another good way to get the scientific name.

Refine your search by adding a state (and county). But also explore other functions such as checklists under the “Flora Projects” tab. These checklists link to a Golden Key that aids plant identification.

If you get no results for a search, try something different. No results may mean the plant has not been found in the search area, or you may not have any results due to how you asked the question. If it is a North American plant, and you spell the scientific name correctly, you should get hits.

Once you have search results, open the map link to see where specimens have been collected. This will show how close the plant has been found to where you live.

Click on the map dot to bring up the specimen record for that location. Here you will find all the details of when and where the specimen was collected, along with a picture of the specimen image. Also use the scientific name to check out the information rich Species Pages.

Check out step-by-step instructions for using Midwest Herbaria at <https://herbarium.bio.indiana.edu/species-info/index.html>.

The website has a lot more capabilities than just

Where? — continued at right

Opportunities for the Citizen Scientist

Okay — you have rethought your home landscape and removed noxious non-native species. You have planted native and near-native species and shared your enthusiasm with neighbors. What's next? Here are four suggestions for ways to deepen your involvement with the Indiana flora and learn more about nature with the whole family.

Plant Photographic Scavenger Hunt:

This INPS supported effort was highlighted in the spring issue of the Journal. Nonetheless a reminder is timely since the project continues until somewhat after killing frosts. Participants are asked to photo document plants in their "ecoregion" by studying the Hunt Lists and the detailed information at <https://herbarium.bio.indiana.edu>. Submit your best photos and enjoy seeing them on the www.midwestherbaria.org data portal.

The Great Sunflower Project: According to their website at www.greatsunflower.org, "People all over the country are collecting data on pollinators in their yards, gardens, schools, and parks. Together, we take counts of the number and types of pollinators visiting plants (especially sunflowers). Over the past few years, scientific studies have suggested that both honey bee and native bee populations are in trouble. What we don't know is how this is affecting pollination of our gardens, crops, and wild lands. In 2008, we started this project as a way to gather

information about our urban, suburban, and rural bee populations and to give you the tools to learn about what is happening with the pollinators in your yard."

You likely have watched various pollinators working in your yard. This website provides tools for their identification. This includes to participants free, downloadable bee identification cards and observer booklets.

Indiana Phenology: "Phenology is nature's calendar — when cherry trees bloom, when a robin builds its nest, and when leaves turn color in fall. Timing is critical: birds time their nesting so that eggs hatch when insects are available and insect emergence is often synchronized with leafing out of host plants." According to their website at www.indianaphenology.org/home "changes in phenological events like flowering and animal migration are among the most sensitive biological responses to climate change. Across the world, many spring events are occurring earlier, and fall events are happening later, than they did in the past. However, not all species are changing at the same rate or direction, leading to mismatches. How plants and animals respond can help us predict whether their populations will grow or shrink, making phenology a 'leading indicator' of climate change impacts." This is an excellent way to engage the younger members of your family!



Paul Rehrock

Black swallow-wort (Cynanchum louiseae) is among the top 20 new invasive species being tracked.

Where? — continued from left

determining if a plant species is known from your area, and this is only an introduction to what you can do with the site. Previously Kay Yatskevych's *Field Guide to Indiana Wildflowers* was my primary source for identification and determining if a plant was native, and while this is a book everyone should have, I now find myself checking the Midwest Herbaria on a regular basis. The two make a powerful combination!

Howard Webb has a remarkable front yard prairie, a "requirement" of karst restrictions. He is a member of the South Central Chapter of INPS.

Report IN: Have you discovered a cluster of invasive plants in your area? Share information about your sighting via Report IN, an interactive program that compiles citizen reports of invasive species around the state. The program is built upon EDDMapS, a simple, interactive Web interface that lets you submit your observations and view results through interactive queries into the EDDMapS database. Learn more about this effort by visiting our INPS website www.indiananativeplants.org/invasive-plants/reporting-an-invasive-plant-sighting/.

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Mission

To promote the appreciation, preservation, scientific study, and use of plants native to Indiana.

To teach people about their beauty, diversity, and importance to our environment.

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Membership: INPS is a not-for-profit 501(c)(3) organization open to the public. Join at www.indiananativeplants.org.

Share online: Send information for posting to webmaster@indiananativeplants.org.

Landscaping with Natives: New Initiatives

By Bill Daniels

Have you ever thought about growing your own native plants from seed? Well, if you have, the INPS Landscaping with Natives team strongly supports this. Growing your own can be an enjoyable and rewarding experience, and potentially provide more plants for your property at a much lower cost, requiring mostly your time, effort, and patience.

For many, the foremost benefit of growing your own plants from seed is the joy you receive from forming an intimate relationship with the plant, being able to see the plant at every stage of its development – from seed, to seedling, to developing plant, to flower.

If “growing your own” is an interest of yours, check out the new information and resources provided by our Landscaping with Natives team found on the INPS website! (www.indiananativeplants.org/growing-native-plants-from-seed/). There you will find a wealth of information on where and how to acquire seeds, including responsibly collecting your own, how to sow them, recommended books, and videos (several by our own INPS members) providing step-by-step help in propagating seeds at home.

Staying on topic, our team wants to make you aware of another pilot project, Native Seed Communities. Native Seed was rolled out last month by the South Central Chapter.

The Communities’ mission is to “Increase available programs, resources, and support, designed to create communities of knowledgeable volunteers and professional growers to responsibly collect, prepare and propagate local provenance, native seeds.”

Native Seed Communities will expand access to native plants as it pursues the following program objectives:

- Demystify growing native plants from seed by providing programs, resources, and support, thus encouraging more people to sow Indiana native seeds.
- Develop communities of trained volunteers working together to collect and propagate Indiana native seeds and plants, especially those of local provenance.
- Promote and participate in special programs, including Pollinator Partnership and Indiana Plant Conservation Alliance.

- Assist businesses that are members of Indiana Native Plant Society’s Buy Native Plants directory with developing plant stock using Native Seed’s local provenance seed.
- Seed-grown plants not used by members in their personal properties to be shared with friends, sold for fundraisers, donated to public gardens, preservation projects, etc.

If growing local provenance, native plants from seed is an interest of yours, especially those of our South Central Chapter’s region, check out the new Native Seed Communities website, www.indiananativeplants.org/a-pilot-project-indiana-native-seed-communities/. In addition, we invite you to be a part of our new Facebook Group, www.facebook.com/groups/525266728469540/, which is open to all. Happy Seed Growing!

Bill Daniels, a retired horticulturist and health and safety professional, is a member of the INPS South Central Chapter and the Landscaping with Natives team.

Seedling Quiz:

Can you identify the two native seedlings below?

A - an annual dicot found in damp, shaded habitat that reaches 3 feet in height.

B - a woodland monocot in the arum family.

See answers on page 5.





Indiana Native Plant Society

2020 Annual Report



The year 2020 certainly challenged all of us, including INPS. The pandemic made it difficult to meet in person for our normal events and hikes and, though we missed the social gatherings that make INPS such an enjoyable organization, we persevered with masks, physical distancing, and Zoom. Indeed, for many of us feeling isolated and alone, our love of native plants was a source of solace and hope and, based on all the posts in the INPS Facebook Group, led to an explosion of hiking, native plant gardening and seed growing. A silver lining to a year filled with loss, perhaps, but let us hope that by the end of 2021 we can resume safely meeting in groups to learn about native plants and enjoy each other's company!

—Ellen Jacquart, INPS President

A Year of Accomplishments

- ✿ Continued to increase **INPS membership**, with over 200 new members in 2020 and an overall 37% increase in membership since 2016.
- ✿ Established a **Diversity, Inclusiveness, and Equality Team** to review our organization's inclusiveness and find measurable actions we can take to reduce barriers so every person can safely enjoy nature.
- ✿ Cancelled our annual **Native Plant Sale and Auction** due to the pandemic.
- ✿ New leadership brought energy and direction to the **Landscaping with Natives** team with emphasis on conservation partnership, a digital education series for gardeners, and guidance for HOAs and municipalities to become more native plant friendly.
- ✿ Gave out \$4,000 in **Biodiversity Grants** to four projects focused on protecting, restoring, or researching native plants in Indiana, including to the Clark County Harmful Invasives Removal Project, Friends of Indiana Dunes, Johnson County SWCD, and the science department at Wabash Middle School.
- ✿ Awarded four grants totalling \$2,514 through **Letha's Youth Outdoors Fund** to get children out in nature. Since most school trips were postponed due to the pandemic, the funds will be held until the trips can be taken.
- ✿ Promoted the implementation of the **Terrestrial Invasive Plant Rule** which made 44 highly invasive plants illegal to sell in Indiana as of April 18, 2020. Provided funds to print *Guide to the Regulated Terrestrial Invasive Plant Species of Indiana*, also available as a PDF.
- ✿ Produced three quarterly issues of the **INPS Journal** (the 2020 Summer issue was replaced with the Annual Report) with new editors Paul Rothrock and Samantha Ransdell taking the helm on the Fall issue.
- ✿ Held our second **Native Plant Photo Contest**, awarding prizes to 1st, 2nd, and 3rd place winners in the Plant Portrait and Landscape Scene categories as well as several Honorable Mentions. For the first time, a separate category was judged for Students in the Plant Portrait category.
- ✿ Held the third annual **Florathon** in which individuals and family units competed to find the most native plants in flower in a 24-hour period. The 12 participants generated 15 new INPS members, 58 donors, and a total of \$3,229.75 for Letha's Fund (more than in 2019!).
- ✿ Certified 93 native gardens in the **Grow Indiana Natives** program, for a total of 283 gardens. The program's Buy Natives Directory now boasts 42 certified Invasive-Free plant sellers and 5 Invasive-Free designers.
- ✿ Held the **Annual Conference** via Zoom. The two-hour meeting featured an overview of the INPS year, election of the Board nominees, announcement of the winners of the Florathon and the Photo Contest, native plant trivia questions, and a presentation by Ellen Jacquart on her 20 favorite places to visit native plants.

Thanks to these donors who supported our work in 2020!

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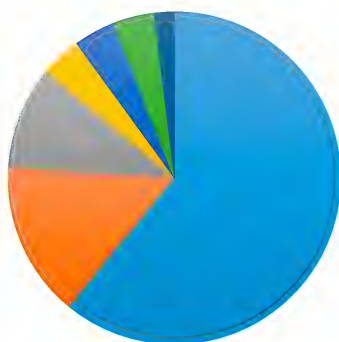
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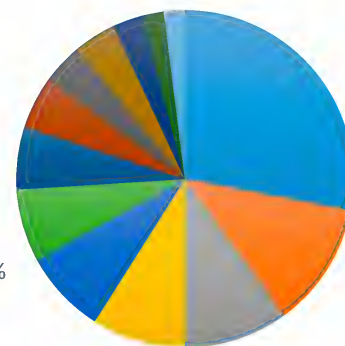
- Membership Dues 61%
- Special Publications 15%
- Wake Up Woods 10%
- General Fund Donations 4%
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- Florathon Donations 4%
- Grow Indiana Natives 2%

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- Publications 28%
- Journal 12%
- Website 10%
- Grants 9%
- Insurance 8%
- Wake Up Woods 7%
- Letha's Fund 6%
- Misc Expenses 5%
- Donations to Others 4%
- Annual Report 4%
- Membership 3%
- Technology 2%
- Grow Ind Natives 2%

Expenses



Native Plant Profile

Sedges

Topped with Pillowy Plumes:

By Scott Namesnik

When native plant devotees hear the word “sedge,” they likely think of grass-like plants with stems that are three-angled and topped by non-descript inflorescences. While accurate to a degree, the cottongrasses (*Eriophorum* spp.), ranking among our most beautiful and showy sedges, do not fit the mold.

Although some species of cottongrass have stems that are at least bluntly three-angled, others have stems that are nearly round in cross-section. The most striking features of this attractive genus, however, is within the inflorescence, where soft bristles develop en masse to create cotton-like heads. Botanists view the bristles as a highly modified perianth, i.e., the equivalent of the more familiar sepals and petals. Carl Linnaeus, who named the genus *Eriophorum*, celebrates this visually striking perianth: *erio* means “wool” or “cotton” and *phorus* means “bearing” (Rothrock 2009).

The genus *Eriophorum* is represented by approximately 25 species worldwide; depending on taxonomic interpretations, there are 11 or 12 species in North America, with seven or eight hybrids (Ball & Wujek 2002, Kartesz 2015). Six of these species have been reported for northern Indiana (five until recently; more on that in a bit), with one presumed extirpated. Only one is not considered a species of conservation concern in the state, yet even it is found exclusively in a rare habitat.

The most striking Indiana cottongrass species is listed as state extirpated. Dense cottongrass (*E. vaginatum* var. *spissum*) forms distinct tussocks to just over two feet tall, with stems spreading and ascending, each topped beginning in May by a solitary spikelet with a

large, rounded tuft of dense, cottony bristles. There also are no leaf-like bracts associated with this tuft, as there are in Indiana’s other cottongrasses. Dense cottongrass grows in acidic bogs and was only known to occur in two northern Indiana counties (Kartesz 2015). To our north and into Canada it is more common and occurs in various types of peatlands (see Arsenault et al. 2013, Rothrock 2009, and Smith 2018 for more details about each cottongrass species). Although one of the Indiana sites has likely been destroyed, the other is intact, and since dense cottongrass seeds can remain dormant for centuries and respond to disturbances such as fire and excavation (Rothrock 2009), there is hope that this species may someday reveal itself as part of Indiana’s flora.

Rusty cottongrass (*E. virginicum*) is our only *Eriophorum* without a status as a species of conservation concern. This is another bog and peatland species, but unlike dense cottongrass it is taller, does not form dense tussocks, and flowers later in the season (typically beginning in late July or August). We’re really “splitting perianth bristles” when we choose the most attractive cottongrass; this one is a looker as well. Rusty cottongrass has several spikelets per stem (though they have short stalks and could appear as a single head at a quick glance), each with distinct rusty-tinged coloration to the cottony tufts. There are also up to five long, leaf-like bracts extending from the base of the inflorescence. Rusty cottongrass is mostly found in the northern fifth of the state, but has a few occurrences as far south as Hamilton County. South of Indiana, this species occurs primarily along the Atlantic coastal plain and in the Appalachian Mountains (Kartesz 2015).

The remainder of Indiana’s cottongrass species have several white cottony tufts in narrower spikelets on longer, dangling stalks.

Narrow-leaved cottongrass (*E. angustifolium* ssp. *angustifolium*) and tall cottongrass (*E. viridicarinatum*) are both considered state threatened in Indiana. These two species are similar overall, both being tall (to over three feet tall), not tussock forming, and having two to four long leaf-like



Top: The clustered spikelets of *Eriophorum virginicum*, with their rusty-tinged bristles, develop later in the year than do those of our other cottongrasses.



Bottom: Dense cottongrass (*E. vaginatum* var. *spissum*), a gorgeous species of the northern boreal zone, may be extirpated from Indiana.

Scott Namesnik

the Genus *Eriophorum* in Indiana

bracts from the base of the inflorescence. Both tend to grow primarily in fens and sedge meadows in Indiana, occurring in other types of peatlands further north. Within Indiana they are mostly restricted to the northern tier of counties, with scattered populations as far south as Madison County (Kartesz 2015). The two can most easily be distinguished by looking at the base of the leaf-like bracts and at the summits of the leaf sheaths. In narrow-leaved cottongrass, the bracts are dark or reddish at the base and the leaf sheath is reddish at the summit. In tall cottongrass, these portions of the plant are green, the same color as the rest of the foliage.

Slender cottongrass (*E. gracile*), another state threatened species, is one of our more easily overlooked species. It is shorter, barely reaching two feet tall, and grows in colonies. A single, stiff bract ascends from the base of the inflorescence but is much shorter than the inflorescence itself, measuring up to $\frac{3}{4}$ inch. This bog species is mostly in Indiana's northeastern region, with few occurrences elsewhere (Kartesz 2015).

This brings us to our final species of cottongrass, and one that was discovered in the state for the first time in 2020, though it certainly was a member of our native flora in hiding. Few-nerved cottongrass (*E. tenellum*), soon to be listed as state endangered, is known from a single site in northwest Indiana. Prior to having collected it with my colleague Roger Hedge, the closest locations to Indiana were Kalamazoo County, Michigan (two counties north of Indiana) and Lake County, Illinois (Kartesz 2015). It is similar in many respects to slender cottongrass and grows in similar habitats. In fact, having collected a presumed slender cottongrass, I was showing the specimen to Paul Rothrock in Fall 2020 when Paul noticed that the bract, although stiff and shorter than the inflorescence, was over $\frac{3}{4}$ inch long. As we examined the specimen, it soon became obvious that the leaf blades were also longer than the sheaths (shorter than the sheaths in slender cottongrass) and that the upper part of the stem was rough to the touch (smooth in slender cottongrass), and that instead of slender cottongrass we were

actually looking at the first ever collection of few-nerved cottongrass for Indiana! Images of the specimen were sent to Tony Reznicek, a world expert on the family Cyperaceae, who confirmed the identification.

As with all plants, and especially sedges, it always pays to take a closer look when making an identification. New discoveries can be made even in a small group like the cottongrasses. It is possible that few-nerved cottongrass is hiding out somewhere else in an Indiana bog, cottony white plumes dangling boldly among surrounding green foliage, just waiting to be discovered.

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Top: The long, white perianth bristles of narrow-leaved cottongrass (*Eriophorum angustifolium* ssp. *angustifolium*) impart a cotton-like appearance to the dangling spikelets.

Bottom: Tall cottongrass (*Eriophorum viridicarinatum*) looks similar to narrow-leaved cottongrass, but the bases of the bracts and summits of the leaf sheaths are green.

Scott Namestnik

Book Review:

“Shifting Sands”

by Kenneth Schoon

Reviewed by Mary Damm

The Indiana Dunes and greater Calumet area are a special place to conservationists (and recreationists) as well as to international industrialists. The Calumet area is a land of juxtapositions - the Indiana Dunes National Park has the third-most plant species of any national park in the country with only fewer species than Great Smoky Mountains and Grand Canyon, while the Grand Calumet River at one time was named the most polluted river in the United States.

Kenneth Schoon tells the story of the Calumet's natural and cultural history in *Shifting Sands: The Restoration of the Calumet Area* (Indiana University Press, 2016). Schoon provides a local perspective

and easy-to-read narrative to the story as a native with family roots in the region and an emeritus professor of education at Indiana University Northwest in Gary.

The book has two main parts. The first describes the abundant natural resources and their use by heavy industry, and the second relates the preservation of remnant natural areas and the clean-up of air, water, and land and efforts to restore biological communities.

Schoon begins by describing the unique biological and geological features. Wildlife (fish, ducks, muskrat, and beaver), fresh water (and ice in winter), sand and more sand, and clay. Burgeoning industries grew because of

these natural resources and their proximity to nearby Chicago. Over the past century and a half, Lake, Porter, and LaPorte counties have been home to major industries - five steel manufacturers, railroad car and cement factories, an oil refinery, and a slaughterhouse - and numerous smaller industries as well. Schoon provides numerous historical photos, postcards, and maps to illustrate the enormous impact of these

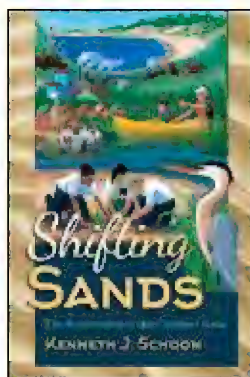
industries on the landscape and the city neighborhoods.

While industry was in full swing, a preservation movement was initiated. This was my favorite section of the book, learning about the heroes, many of them women, that worked tirelessly to “save the dunes” that we enjoy today. As early as the 1910s, the Prairie Club, a recreational hiking organization, sought to protect the Dunes as a national park. Stephen Mather, later to become the first director of National Park Service, and Henry Cowles, “father” of North American ecology, were members of the club and vocal proponents of protecting the Dunes. Another member, Bess Sheehan, promoted the Dunes through theatrical performances at the Dunes, newsreels at the movie palaces of the day, and newspaper articles. When a national park effort failed, Sheehan worked with the Indiana Federation of Women's Clubs, which had 600 chapters in the state, to successfully lobby state legislators to create Indiana Dunes State Park. Another hero, Dorothy Buell, along with 21 other women initiated a second effort to preserve the Dunes as a national park. As part of the effort, the Save the Dunes Council met with all 535 members of the U.S. Congress. The Indiana Dunes National Lakeshore was established in 1966.

Restoration of the Calumet area began with cleaning the air and water. Just as industry made a dominant presence in the area, cleaning the air and water took a monumental effort. Schoon describes environmental legislation - federal and intergovernmental - that led to an immense clean-up of the Calumet area.

The final chapter of the book describes nature preserves and restored areas that are accessible to the public today. Readers can learn of places to visit along the Grand and Little Calumet Rivers and in the cities of East Chicago, Hammond, Gary, Hobart, Portage, Chesterton, Beverly Shores, and Michigan City.

Mary Damm, a member of the South Central Chapter of INPS, is a prairie ecologist and active in sustainable agriculture.



Bess Sheehan (1882-1968): one of the women key to preserving the Indiana Dunes.

Photo courtesy of Westchester Township Historical Museum.

Book Review:

“The Indiana Dunes Revealed: The Art of Frank Dudley” edited by James Dabbert

Reviewed by Nick Harby

I never knew of Frank Dudley until a few months ago. On a visit to one of my favorite museums, the Haan Museum of Indiana Art, in Lafayette, I discovered a painting depicting a scene at the Indiana Dunes. Prominent in the picture was a plant I recognized as butterfly weed (*Asclepias tuberosa*).

The next day by chance I happened to visit the Indiana State Museum in Indianapolis and spotted on the upper level four more of Frank Dudley's paintings. Now I had to learn more about “the painter of the Indiana Dunes.”

According to a loving review of Dudley's life and work, *The Indiana Dunes Revealed: The Art of Frank Dudley* edited by James Dabbert (Brauer Museum of Art, Valparaiso, 2006), the artist had his studio on the shore of Lake Michigan, and created many oil paintings of the dunescape. This biography of Dudley includes a catalogue of seventy-two full page color reproductions of his paintings.

A chapter written by Dabbert provides a biography describing Dudley's life, from his birth in Wisconsin in 1868, to painting barns as a teenager, to going to art school in Chicago in 1888 at the age of twenty. The chapter concludes with Dudley's legacy, including a posthumous purchase of 53 paintings by the State of Indiana, engineered by then-Governor Branigin using cigarette tax money. During Dudley's stay at his Duneland Studio, he paid his rent to the State of Indiana every year with a painting, 19 altogether. The overall collection of 72 paintings is now in the possession of the Indiana State Museum. Four paintings are on perpetual display on the third floor.

Dudley's Duneland Studio at Indiana Dunes State Park is now long gone. But another chapter, written by J. Ronald Engel, chronicles the procession of visitors to Dudley's studio during the formative years of the Save the Dunes movement. Ecologist Henry Cowles was a frequent visitor, as were people like Richard Lieber (father of the Indiana state park system), May Theilgaard Watts (conservation activist



*“Call of the Dunes” by Frank Dudley depicts the effect of harsh conditions on jack pine (*Pinus banksiana*) and the sparse patches of tenacious marram grass (*Ammophila breviligulata*).*

and educator with Morton Arboretum), and Governor Ed Jackson.

In addition to Dudley, dunescapes have inspired artists across North America. Winslow Homer's *The Sand Dune*, John Sloan's *Dunes at Annisquam*, and William Wendt's *Dunes of Monterey* are only three examples.

Before your next visit to the Dunes spend time with *The Indiana Dunes Revealed*. It will broaden your sense of place, especially since it not only contains the artistic vision of Frank Dudley but historical benchmarks such as maps circa 1927 that show wetlands, trails, names of dunes, and floral regions. Discover how much this landscape has changed over the past century.

Nick Harby is a member of the INPS West Central Chapter and lives in Lafayette.

The Genus *Silphium*:

Native Plant Profile

By Josh Randall

If you have visited a remnant tallgrass prairie or prairie restoration in northwestern Indiana, you likely are familiar with the genus *Silphium* (family Asteraceae). Several species are notable for their exceptional height amidst the sea of grass and their bright, sunflower-like inflorescences. These charismatic summer perennials include

shoots with fibrous root systems (Clevinger & Panero 2000). Both groups have tough (i.e., scleromorphic) leaves.

Prairie-dock (unrelated to true docks [*Rumex*]) has huge triangle shaped leaves growing directly from the plant's base. The equally large leaves of compass-plant are deeply divided and curiously tend to orient themselves vertically with the leaf edge aimed southward. In both species the tough leaves, with their thick veins and strong petioles, ensure the plant can survive the harsh drought-like conditions the prairie may offer during the summer. As a result of their large storage roots, prairie dock and compass-plant are well adapted to stressful environments that include frequent natural fires. When about to flower, these species bolt, pushing their inflorescences above the surrounding vegetation to a height of up to 10 feet.

Cup-plant is likely to become the most famous member of this genus as the biofuel industry mines its potential for bountiful cellulose, the structural molecule that supports its huge height and strong leaves. Cup-plant grows tall leaf stems throughout the season. The "cups" that surround the main stem are expanded leaf bases that hold water following rains. While still a very tough looking plant, you may find this species growing in moist habitats.

Entire-leaf rosinweed is the least tough *Silphium* common to Indiana prairies. It is often confused for a wild sunflower due to its thinner stems and leaves. The name rosinweed is a reference to the resinous fluid that several members of this genus excrete after being damaged. Similar to the latex of milkweeds (*Asclepias*), this fluid has evolved as a strategy to reduce herbivory.

In addition to being a beautiful sign of prairies, the genus *Silphium* tells an interesting story of evolution from dry habitat to wet habitat, a scenario that is not very common in plant life histories (Crisp et al. 2009). These jumps are important to understand as climate change and habitat loss will result in a mix of species loss or successful adaptation, especially in already vulnerable habitats such as the forest-prairie transition of western Indiana.



Cup-plant (above) and rosinweed have profusely leafy stems and look more sunflower-like.

prairie-dock (*Silphium terebinthinaceum*), compass-plant (*S. laciniatum*), cup-plant (*S. perfoliatum*), and entire-leaf rosinweed (*S. integrifolium*). The genus *Silphium* is composed of two subgenera, distinguished by their growth habit: either rosettes of large leaves and taproot systems or sunflower-like

Paul Rothrock

Icons of Indiana's Prairies

The transition into wetter habitats by the ancestors of prairie-dock and cup-plant involved adaptation of their water conducting tissues. The greater reliability of soil moisture allowed selection of more vulnerable hydraulic traits, like greater vein size and decreases in structural material, and thus greater susceptibility to drought if it were to occur. Drought is dangerous to plants because it increases the chance of embolism, air bubbles that block veins, and the subsequent loss of function of adjacent leaf and stem tissue.

Mason & Donovan (2015) observed that species in the family Asteraceae follow the so-called leaf economic spectrum. This is the idea that plants cannot invest resources infinitely, but must make specific tradeoffs that define the life strategies for individual species. In the genus *Silphium*, tradeoffs centered on changes in leaf mass / inch², lignin and cellulose content, and growth form within this genus. Regardless of the specific life strategy of our *Silphium* species, each is beautifully adapted and collectively these iconic prairie wildflowers demonstrate a cross-habitat evolution that may become more important in the uncertain years to come.

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Josh Randall is a first year Ph.D. student in Ecology and Evolutionary Biology at Yale University, studying the evolution of leaf physiology in the shrub Viburnum. He completed his undergraduate in Botany at Purdue where he pursued research on Silphium and became excited by plant morphological diversity.



Left: Compass-plant, like prairie-dock, sends up long flowering peduncles.

Below: Prairie-dock has a basal rosette of leaves whose blades reach 18" long.



All photos by Paul Rothrock

An Artist's Reflections: Indiana Dunes

Natural Area Profile

By Gillian Harris

Several years ago, as Artist-in-Residence at what was then Indiana Dunes National Lakeshore, I wandered the Lake Michigan shoreline with my camera, exploring beaches, dunes, swales, prairies, fens, bogs, marshes, and black oak savannas. My aim was to make digital and mental images of the unique habitats that comprise the Dunes, inspiration for botanical paintings. Choosing a topic for the artwork I committed to give in exchange

asters (*Doellingera* and *Symphyotrichum*) and white turtlehead (*Chelone glabra*), golden orb weavers (*Nephila*) hung on massive webs, scarlet and blue-black fruits abounded, and caterpillars ruled (e.g., fawn sphinx – *Sphinx kalmiae*, turbulent phosphila – *Phosphila turbulenta*, and asteroid – *Cucullia asteroides*).

On the Cowles Bog Trail winterberry fruits (*Ilex verticillata*), mushrooms, and huge *Osmunda* ferns along the wooded path gave way to dunes and the dazzling aqua marine of Lake Michigan on a clear day. Migrating monarchs flitted along the lakeshore, up and over the dunes to the prairies and savannas where showy goldenrod (*Solidago speciosa*), one of their favorite waystations, flourished.

I found the black oak savannas of Tolleston Dunes and Miller Woods enchanting—the savanna is a vanishingly rare ecosystem that is distinct from the mixed mesophytic hills and hollows of my home in southern Indiana. It was a delightful habitat to explore, even long after the bloom time of the famous lupines (*Lupinus perennis*). I joined a ranger-led walk at Miller Woods on the first day of my residency, and happened to meet Nathanael Pilla, co-author with Scott Namestnik of the forthcoming guide to *Wildflowers of the Indiana Dunes National Park*. The trail, winding through savanna and wetlands to emerge in the dune-and-swale landscape and then the lakeshore, was replete with asters, goldenrod, purple gerardia (*Agalinis purpurea*), rough blazing star (*Liatris aspera*), and the jewel tones of bottle and fringed gentians (*Gentiana andrewsii* and *Gentianopsis crinita*), and great blue and Kalm's lobelia (*Lobelia siphilitica* and *L. kalmii*).

I was especially drawn to the lobelias, which grew in proximity to one another along a swale edge. The juxtaposition of the two species intrigued me—same genus, similar flower structure, yet so different in size, hue, and form. Probably due to a broken stem that had regenerated, one great blue lobelia had produced a stunning profusion of intense blue-violet flowers. A responsible botanical artist is restricted to portraying the

Reflections — continued at right

The "Two Lobelias" and their pollinators.

for the Dunes experience proved difficult, with an overwhelming amount of material. I walked every trail in the park during my two-week residency, sharing hikes with my husband and friends, but mostly going it alone.

The Great Marsh became especially familiar; I haunted it almost daily as it was near my lodgings. I watched the progression of summer into autumn throughout my September stay. Migrating monarchs (*Danaus plexippus*) sipped nectar on sunflowers, bees (*Anthophila*) worked the large swathes of

Gillian Harris.



Roots — continued from back page

type gradually succeeded into another.

Cowles remained at the University of Chicago throughout his career, becoming a master teacher. His proteges, including William Cooper, considered Cowles' teaching an even greater contribution to science than his research.

"Even greater is the number of teachers who have learned from him [Cowles] how to use the out-of-doors, how to bring pupils directly to nature, and, above all, how to unfold to them the myriad mysteries of biology..." (Cooper 1935)

Thanks to Cowles' enthusiasm for teaching in the outdoor laboratory, many of us in the life sciences can trace our academic pedigree to Cowles. I for one! Cooper passed Cowles' legacy on to his students including Rex Daubenmire and Henry Oosting. Daubenmire counted among his alumni John Crow who I sat under as an undergraduate. Oosting's alums included Dwight Billings who trained Richard Wagner, my master's

Reflections — continued from left

typical growth habit of her subject. But I could not resist painting this lush cluster of blossoms in transparent layers of magenta and marine blue, suggesting other shoots, growing in their usual form and beginning to set fruit, in pencil. At the bottom of the painting, I put in the delicate, pale periwinkle Kalm's lobelia, which I hadn't seen since my days in Michigan exploring the upper Great Lakes and was thrilled to find here. Adding pollinators to each plant completed the image—as it always does.

I gave the original of "Two Lobelias" back to the Dunes National Lakeshore, where it was born. Looking at the digital image of the work always evokes for me its surrounding landscape, the flora that grew there, and the myriad creatures that depend on the plants and the entire ecosystem of the Dunes. The tracks of snakes, toads, birds, and mice decorated the sandy path that wound through the swale beneath the lobelias—intricate patterns more beautiful than any painting a wandering artist could create.

Gillian Harris is an active member of the South Central Chapter of INPS and artist for Wake Up, Woods.

advisor while I was at Penn State.

The roots of American ecological science have profound connections to Indiana via the Dunes and Henry Cowles. Together they dramatize succession both on the dynamic landscape and in human endeavors.

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Henry Chandler Cowles (1869-1939). Cowles Bog in the Dunes National Park was named in his honor. Photo from University of Chicago Photographic Archive, apf1-01969r, Special Collections Research Center, University of Chicago Library.

Get On Your Boots!

***"Get on your boots and follow him,
He's half a mile in front,
It's our own Dr. Cowles himself
Out on a lichen hunt."***

***"It's our own Dr. Cowles you know;
They've lost the pattern since
Of all our friends afar and near
He surely is the prince."***

**— May Theilgaard,
writing about her botany professor,
Henry Chandler Cowles**



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Naturalist Profile

The Indiana Dunes: The Roots of Ecology in America

By Paul Rothrock



Marram grass (Ammophila breviligulata) building a foredune at the Indiana Dunes State Park.

Since the last glacial ice receded off the Indiana landscape, stiff wind off Lake Michigan, periodic vegetation fires, and changing water levels have continuously shaped the Indiana Dunes. In addition, the northwest corner of Indiana is the meeting place of floras from northern forest, eastern hardwood forest, and tallgrass prairie. All of these factors make the Dunes an amazing laboratory for natural science. And yet, surprisingly, from the vantage point of a dune ridge, on a clear day one can see the skyline of Chicago to the northwest across Lake Michigan.

In the 1890s, Henry Chandler Cowles, an energetic graduate student at the University of Chicago, decided to take advantage of the proximity of the Dunes for his Ph.D. research. After all, the many habitats were readily accessible from the city via rail. The result: Cowles launched modern ecological research in America and became the academic ancestor of generations of scientists.

Cowles (1899) stated in his seminal paper that “the province of ecology is to consider the mutual relations between plants and their environment.” But the environment in which plants grow “is composed of a myriad of topographic forms [that pass] into one another by a series of almost perfect gradations.” Moreover these landscape features are dynamic,

never twice alike. “Ecology is a study in dynamics” and the ecologist endeavors to discover the laws which govern these changes.

To best investigate these laws one needed an environment where change was rapid but recurring over time, an apt description of the Indiana Dunes. Cowles’ ideas remain foundational in the study of ecological succession¹ and had an oversized role in inspiring scientific careers.

One of Cowles’ many insights into ecological succession was the role of vegetation, especially marram grass (*Ammophila breviligulata*), in forming new dunes. Sand grains blown across the beach by prevailing winds become trapped by plant stalks. As grains accumulate marram grass grows upward keeping pace with the accumulation of sand. Cowles’ essential insight was that this began the process of dune building. As this process played out over time, coupled with periodic changes in lake water level, new foredunes formed. Thus dune formations further away from shore are older. Moreover, these older dunes support woodlands (and completely lack marram grass), a clue that one community

¹ Ecological succession is a series of progressive changes in the species that make up a community over time.